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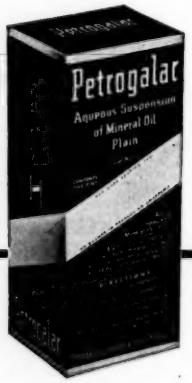

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Some Observations on Bacterial Meningitis*

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MEDICAL DIRECTOR OF THE HENRIETTA
EGLESTON HOSPITAL FOR CHILDREN
ATLANTA, GA.

Bacterial meningitis is frequently encountered in infancy and childhood. Before the advent of chemotherapy one undertook the treatment of all cases of septic meningitis, with the exception of meningococcic meningitis, with an almost hopeless outlook. Fortunately today we have potent means at hand to fight these infections. At present, however, there is no unanimity of opinion as to the ideal methods of treatment for the various types of septic meningitis. There is much to be learned regarding the proper use of the sulfonamide drugs in meningitis. Undoubtedly, a greater knowledge of their potencies and dangers will pay handsome dividends in the health and lives of many children.

This paper is presented with the hope that a brief resume of the experiences of others, and our experience in the treatment of these infections will aid in clarifying certain problems which have arisen.

We have been particularly impressed during the past few years with the apparently increasing incidence of influenzal meningitis among the admissions to Henrietta Egleston Hospital for Children in Atlanta. The treatment of this disease has been of especial interest to the staff and will be discussed in considerable detail.

The relative frequency of the various types of septic meningitis as encountered in this hospital is summarized in Table I. A total of one hundred thirty-four cases have been treated during the period from 1928 to 1942. Of this number forty-five were due to the meningococcus and are analyzed separately from the other infections—for obvious reasons. The mortality rate for the entire group of meningococcic meningitis was 24.4%. Before chemotherapy there were thirty-eight patients treated with serum or antitoxin with a mortality rate of 29%. Since chemotherapy there have been only seven children suffering with meningococcic meningitis admitted to the hospital, with no deaths.

SEPTIC MENINGITIS - HENRIETTA EGLESTON HOSPITAL FOR CHILDREN
1928 - 1942

	All Cases Treated			Before Chemotherapy			After Chemotherapy		
	Number	Deaths	Rate	Number	Deaths	Rate	Number	Deaths	Rate
Staphlococcus	6	5	83.3%	4	3	75 %	2	2	100 %
Streptococcus	17	16	94 %	16	15	94 %	1	1	100 %
Influenza	30	24	80 %	15	14	93%	15	10	66%
Pneumococcus	36	31	86 %	19	19	100 %	17	12	70%
Total	89	76	85 %	54	51	94.4%	35	25	71%

Meningococcic Meningitis

	All Cases Treated			Before Chemotherapy			After Chemotherapy		
	Number	Deaths	Rate	Number	Deaths	Rate	Number	Deaths	Rate
Total	45	11	24.4%	38	11	29 %	7	0	0%

A study of the mortality rate, however, is not the sole criterion upon which therapy should be evaluated. Serious complications must also be analyzed. Twenty-seven of the thirty-eight patients suffering with this infec-

*From the Henrietta Egleston Hospital for Children, Atlanta, Georgia.
Read before Annual Session, S. C. Medical Assoc., Columbia, S. C., May 21, 1942.

tion survived without chemotherapy. Of this number thirteen were under one year of age, four of whom had developed hydrocephalus and two were blind; five were in their second year,—one of this number suffered with impaired hearing and vision; nine were over two years of age,—of this group one was blind in one eye, one was deaf and one partially deaf. A total of ten patients then survived the infection but with serious and permanent defects,—a complication rate of about 40%. In contrast to this figure,—of the seven patients receiving chemotherapy only one child showed an important complication. This patient was over two years of age and at the time of discharge was blind and spastic. The complication rate in this group was approximately 15%.

There were eighty-nine cases of septic meningitis due to the four other most frequently encountered organisms producing this disease. The mortality rate for the entire group was 85%—before chemotherapy being 94.4%; after chemotherapy 71%. It is important to note that this improvement in mortality rate took place only in the cases of influenzal and pneumococcal infections. However, it is striking to observe that streptococcic meningitis has practically disappeared in this hospital since the advent of chemotherapy; and consequently these comparative figures on mortality taken before and after chemotherapy are of little value. The splendid reduction in the incidence of this disease is undoubtedly due to the fact that suppurative otitis media and

Table II

Suppurative Mastoiditis
Henrietta Egleston Hospital for Children
Atlanta, Georgia

	1936	1937	1938	1939	1940	1941
ACUTE	21	10	15	7	7	2
CHRONIC	8	4	0	2	5	2
TOTAL	29	14	15	9	12	4
DEATHS	4	3	4	0	0	0

mastoiditis have been greatly reduced in the four years by means of chemotherapy. As will be seen from Table II no child has died as the result of mastoiditis since 1938.

Further explanatory remarks are indicated in regard to the statistics for influenzal meningitis. Before chemotherapy fifteen cases were treated with one recovery. This child who recovered received 140 c. c. of anti-influenzal serum (intravenously and intramuscularly) over a period of six days. She is perfectly well today without complications. Of the fifteen cases treated since chemotherapy five received only sulfanilamide and serum—all died. Of the ten cases treated since the advent of sulfapyridine and sulfadiazine five have recovered. Further since November, 1940 when the intensive treatment with sulfapyridine and sulfadiazine was adopted seven patients have been observed only two of whom have been lost. The details of this treatment with case reports follow later in this paper.

The incidence of septic meningitis, according to years, as shown in Table III brings out

Table III

INCIDENCE OF SEPTIC MENINGITIS 1928-1942
HENRIETTA EGLESTON HOSPITAL FOR CHILDREN

	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941	1942
Meningococcus		11	5	7			3	1	7	3	2	3		2	1
Pneumococcus	1	3			4	2	1	2	2	3	3	7	4	2	2
Influenza			1	2		1	2	2		5	5	3	3	4	2
Streptococcus		1	5	5			1	2	2		1				

some rather interesting trends. First, as already noted, streptococcic meningitis has been encountered only once since 1937. The reason for this as explained in the discussion of Table II seems undoubtedly due to the excellent results obtained with the sulfonamide drugs in the treatment of otitis media and mastoiditis.

Although this series is small it appears that influenzal meningitis is definitely on the increase in Atlanta. As will be seen in Table III, twenty-two of the thirty cases treated during the fourteen year period under observation occurred in the past six years. Whether this apparent trend is of true significance is uncertain at this time.

Pneumoccic meningitis has showed little variation in incidence during the period of this study, save for the year 1939 when it was

observed almost twice as frequently as in any other year.

The annual incidence of meningococcic meningitis for this small group follows quite definitely the trends which have been observed in the national figures for this disease. Definite peaks occurred in the nation in 1929-30 and 31 and again in 1936 with a great decline in the years 1932-33.

Table
Age Incidence of Septic Meningitis
Henrietta Egleston Hospital for Children - Atlanta, Ga.

	Meningococcus	Pneumococcus	Influenza	Streptococcus	Staphylococcus
Under one year	22	15	16	4	3
One to two years	7	7	6	2	2
Over two years	16	14	8	11	1
Total	45	36	30	17	6

Table IV gives the age incidence of septic meningitis as observed in this group. 50% of the cases of meningococcic, pneumococcic, influenzal and staphlococcic meningitis were encountered during the first year of life, whereas streptococcic meningitis is quite definitely a disease of older childhood—60% occurring in children over two years of age.

A word as to the trends in the therapy of septic meningitis may be of interest before giving our experiences with the modern therapeutic agents. The early specific therapy with antimeningococcic serum intrathecally, gave remarkably good results. The introduction of the intravenous use of both serum and antitoxin, so ably advocated by Hoyne, enhanced the value of this treatment considerably. The results of the treatment of influenzal and pneumococcic meningitis with anti-sera in the hands of most observers were almost universally bad.

The advent of the sulfonamide group of drugs suddenly placed into the hands of the physician a wealth of potent weapons with which to fight these infections. Although there is as yet no unanimity of opinion as to the choice of drugs for each type of meningitis, much progress has been made.

Certain authorities seem loathe to omit antimeningococcic serum in the treatment of this infection in spite of the brilliant results obtained with the sulfonamide drugs. As late as 1941 Keefer[1] advocated the intravenous use of (anti-meningococcic) serum for children under two years of age with no mention of chemotherapy, although he advised chemotherapy exclusively for the adult.

As investigation progresses, however, it seems obvious that chemotherapy will replace anti-meningococcic serum and antitoxin.

Hodes[2] and Strong recently reported one hundred ten patients suffering with meningococcic meningitis treated with sulfonamides alone. Twelve cases died. They conclude that sulfathiazole and sulfadiazine are superior to sulfanilamide in the treatment of this disease.

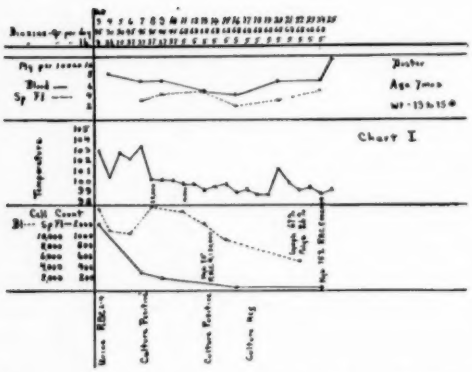
Rundlett[3], Gnassi and Price report twenty three consecutive patients cured of meningococcic meningitis with sulfadiazine alone. A spinal fluid level of eight to twelve mg% was as a rule adequate.

Spinks in his excellent monograph uses sulfapyridine alone in the treatment of meningococcic meningitis with excellent results. He advises two to three grains per pound body weight each twenty-four hours administered intravenously every eight hours for two or three days, after which the drug is given by mouth. He suggests that the drug be continued for at least one week after temperature is normal.

Bankston in the Lancet in 1941 reports that sulfathiazole alone is effective in the treatment of meningococcic meningitis even though the spinal fluid concentration was not above 1.2 mg.%.

Our personal experience with the various sulfonamides in meningococcal meningitis may best be presented in the form of case reports.

Billy D., age seven months, weight thirteen and one-half pounds, became suddenly ill on October 1, 1941 with grunting respiration, muscular twitchings and temperature 103°. Severe convulsions occurred on October 2nd. He was admitted to the hospital on October 3rd. The physical examination revealed an acutely ill infant with definite evidence of meningeal irritation. Chart I gives in detail



the course of the illness and the effect of therapy. The upper division of the chart indicates the total drug administered each day and the grains per pound body weight each twenty-four hours. Sulfadiazine alone was administered by the oral route. In the beginning three grains per pound body weight for each twenty-four hours was given, but on account of a persistently positive spinal fluid culture the dosage gradually increased to five grains per pound per day. The second section of the chart shows the drug concentration in both blood and spinal fluid. It is interesting to note that the blood concentration fell steadily from the 4th to the 16th of October in spite of a gradual increase in dose. There was a rapid drop in spinal fluid cell count from the beginning of therapy. The spinal fluid culture was found to be negative on the 17th of October or the fourteenth day of treatment when the blood concentration of the drug was approximately 6 mg.%, and the spinal fluid concentration was between 2 and 3 mg.%. The drug was continued at the maximum dose for one week after the cultures were negative. No untoward effects on kidney or blood were noted in spite of the large doses of sulfadiazine given. The infant was discharged in good condition with no evidence of complications.

The following case of Terrill T. suffering with meningococcic meningitis is briefly summarized to show the combined effects of treatment with sulfadiazine and sulfapyridine. The baby was twenty months of age and weighed twenty-five pounds. He was admitted on December 11, 1941 with a story of sudden high fever for eighteen hours; drowsiness and a rash for the past eight hours. On admission the infant was stupurous, temperature was 102.6. There was no evidence of meningeal irritation; petechiae were scattered over trunk and extremities. The spinal fluid cell count was 2,565 with a positive culture for the meningococcus.

The following daily dosage was employed:

Dec. 12-Dec. 17—Sulfapyridine grains 15 (I. V.)—Sulfadiazine grains 45 (P. O.) Blood Concentration 11 mg.%.—Spinal Fluid Concentration 6.9 mg.%.

Dec. 18-Dec. 26th—Sulfadiazine grains 90 (P. O.) Blood Concentration 9.8 mg.%.

Dec. 27-Jan. 1st — Sulfadiazine grains 45 (P. O.) Blood Concentration 6.8 mg.%.

On December 17th the spinal fluid culture was negative.

On December 17th the spinal fluid cell count was forty-two.

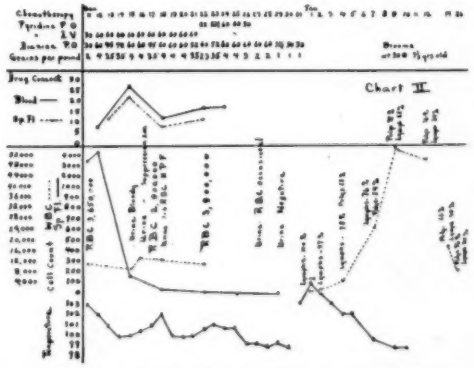
On December 22nd the spinal fluid cell count was five.

Except for a moderate reduction in hemoglobin no untoward effects of the drug were noted. The child was discharged from the hospital eighteen days after admission. He seemed to be perfectly well and has remained so.

As stated at the outset of the paper, this investigation of our experience with septic meningitis was prompted by the apparent increased incidence in influenzal meningitis and the very encouraging results obtained in treating this infection with the sulfonamide drugs. In influenzal meningitis we were dealing with a very grave infection which in the past was practically 100% fatal and therefore heroic measures were justified in fighting the disease, although such measures might not be without a definite danger to the patient. We felt that if chemotherapy were to succeed the organism must be attacked quickly and with what appeared to us massive doses of the drug. For speed, therefore, we have introduced the drug intravenously in large doses for several days, in addition this has been supplemented by oral therapy and finally in the latter days of treatment, the oral therapy has replaced the intravenous therapy. Our total sulfonamide drug administration has varied between four and six grains per pound body weight in each

twenty-four hours. The following case reports give in detail blood and spinal fluid concentration obtained under this regime, the effect upon the infecting organism and the untoward effects upon the host.

Bobby B. three years and four months developed fever in the late afternoon of December 10th. During the night temperature rose to 105°, he vomited and complained of headache. He was seen in the home at 10:00 A. M. on December 11th. The temperature was 104, throat was inflamed and tonsils enlarged. There was definite evidence of meningeal irritation. He was admitted to hospital at once. Chart II summarizes the treatment and its ef-



fect. The spinal fluid cell count was 3,482. The smear and culture were positive for H. Influenzae, type B. In the upper section of this chart the dosage of sulfapyridine and sulfadiazine is shown with the method of administration and the total number of grains per pound body weight for each twenty-four hour period. It will be noted that for a period of ten days this child received two grains per pound body weight intravenously of sulfapyridine in each twenty-four hours period, and two grains per pound body weight of sulfadiazine, by mouth, a total sulfonamide intake of four grains per pound body weight per 24 hours. The blood concentration shown in the second section of this chart is interesting. On the fourth day of treatment a peak of 26.7 mg.% in the blood and 23.4 mg.% in the spinal fluid was reached. In spite of a sustained dosage of four grains per pound body weight per day the drug concentration rapidly dropped to about fifteen in the blood and ten in the spinal fluid. In the third section of this chart the blood and spinal fluid cytology are graphically depicted. The cell count in the spinal fluid was normal on the seventh day of treatment and the culture of the fluid was negative on this day.

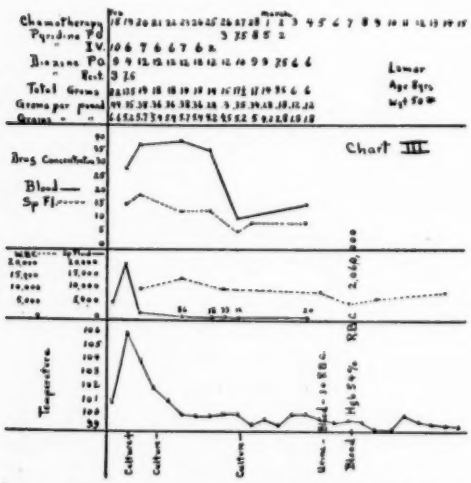
The drug was continued at the maximum, both by vein and orally, for three days after the spinal fluid was apparently normal. At this time, the intravenous sulfapyridine was omitted but continued by mouth, along with the sulfadiazine for a period of five days. On December 26th, the fifteenth day of the illness, sulfapyridine was omitted; sulfadiazine was continued for five additional days, but only one gram per pound body weight was administered for the last three days. To summarize: Over a period of twenty days, 56 grams of sulfapyridine and 71 grams of sulfadiazine were administered.

Certain very interesting reactions were observed in this child which were attributible to the medication. On the fourth day of treatment, the urine was grossly bloody; on the fifth day there was a marked urinary suppression. It was determined to continue the drugs in spite of these findings. Large amounts of fluid were introduced into the vein with a very satisfactory response on the part of the kidney. The blood quickly disappeared from the urine, except for an occasional red blood cell noted at times throughout the illness.

The effect upon the blood of this individual was also quite striking. The anemia became marked early, but by means of transfusions, the red blood cells and hemoglobin were adequately maintained. On the 21st day of the childs illness, when he seemed perfectly well, there was a sudden jump in temperature to 105 degrees; the throat was inflamed; the spinal fluid normal. A blood examination revealed a total leucocyte count of 1500, with a complete disappearance of polymorphoneuclears. A septic temperature persisted for six days; the cervical glands became greatly enlarged, and ultimately suppurated and were drained. During this period a dramatic change took place in the blood. On January 1st, the white cell count was 1500 with 100% lymphocytes; on January 9th, the total white count was 55,800 with polymorphonuclears 72%,

lymphocytes 20%. On January 17th, there were 18,000 white cells with 66% polymorphonuclears, and on January 26th, the count was 8,600 white cells with 73% polymorphonuclears. This so-called leukemoid reaction is intensely interesting, and has been the subject of considerable investigation. The patient is perfectly well today, with a normal blood picture.

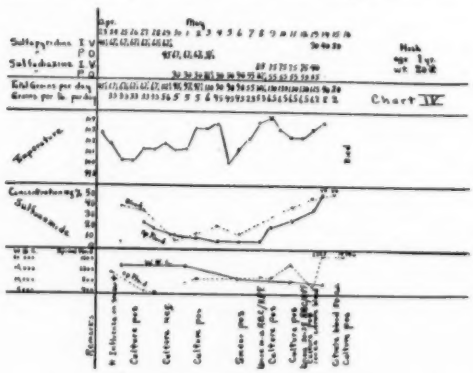
Patsy L. — age eight years — weight 50 pounds—developed a severe headache on February 16, 1942. There was vomiting and high fever on February 17th; on the 18th she became irrational. The important physical findings on admission were marked evidences of meningeal irritation, and a left internal squint. The child was totally irrational, and her temperature was 101 degrees. Her spinal fluid cell count was 5328; the culture was positive for H. Influenzae Type B. Chart III



summarizes the salient features in this case. The upper section of this chart indicates the dosage. The general plan was to administer three grains per pound body weight each twenty-four hours of sulfapyridine intravenously, and the same amount of sulfadiazine orally. This schedule was not maintained in its entirety on account of vomiting. It will be noted that a very high blood concentration was obtained by the third day of treatment. A level of 35 to 40 mg.% was maintained for six days. During this period, the spinal fluid concentration varied from 12 to 18 mg.%. The spinal fluid was sterile on the fourth day, and the cell count was below 100. It is interesting to note the sharp drop in blood concentration of the sulfonamides when sulfapyridine was omitted by vein and given by mouth. Strikingly little change in the spinal fluid concentration is noted at this time. To summarize: This child received a total of 230 grams of the drugs over a period of fifteen days. During the administration of one dose of intravenous sulfapyridine there was rather severe apnea and cyanosis; other than that no grave complications occurred which might be attributed to the drug, although the anemia was quite marked. The white blood count as indicated in the graph varied between 5000 to 15,000 with a normal differential count. This child is well today, with no complications or sequelae.

The following case is reported to show that in spite of extremely high concentrations of the drug in both blood and spinal fluid, it appears impossible at times to sterilize the spinal fluid, and death results.

Baby Nash — age one year — weight 20 pounds—was admitted to the hospital on April 23, 1942. There was a story of sudden onset twenty-four hours ago, with fever and vomiting. Convulsions occurred the morning of admission. Chart IV gives the important data



concerning this child's stay in the hospital which terminated in his death. The plan of drug administration was much the same as the two other cases already reported except that no sulfadiazine was administered for the first week. Intravenous sulfapyridine 3.3 grains per pound body weight per day gave an immediate concentration of 40 mg.% in the blood; how-

ever, in spite of the fact that this dose was maintained, the blood concentration dropped rapidly to a point below 10 mg.% at the end of one week. The spinal fluid culture remained positive. At this point, it was decided to give massive doses of sulfadiazine both by mouth and intravenously; 6.5 grains per pound body weight per day were administered with a rapid rise in blood and spinal fluid to the unprecedented peak (in our work) of 92 mg.% in the blood, and 78 mg.% in the spinal fluid. In spite of such tremendous concentrations in the blood, the spinal fluid culture was positive persistently until the day of his death. We were unable to detect any untoward effect of the drug which might have produced this death.

To summarize: Since the adoption of this intensive mode of treatment, seven patients have come under our care, and only two of these children have died. The ages of the living children were eight, five, and three years, sixteen and ten months, respectively;—the two children who died were twelve months and nine months old respectively.

Although specific influenzal serum has been disappointing in the hands of most workers, there are certain notable exceptions:

Alexander[4] reports a total of 50 cases of influenzal meningitis treated with a combination of sulfonamide and specific rabbit antiserum with thirty-seven recoveries. She concludes that, "All sulfonamide derivatives used thur far exert a significant inhibitory effect on H. influenzae infections in children," and further that, "Type-specific antibody is an essential part of therapy in a number of patients (the proportion not yet known) with H. influenzae meningitis."

Neal reports twenty-nine cases of influenzal meningitis with fourteen recoveries. The majority of these children were treated with a combination of sulfapyridine and specific serum. However, she reports five patients who recovered in whom sulfapyridine alone was used.

A recent report by Sako, Stewart and Fleet[5] gives excellent results in the treatment of influenzal meningitis with sulfadiazine. The drug was administered by mouth in relatively small doses, resulting in blood levels of approximately 20 mg.%, and spinal fluid concentration of 10 to 15 mg.%. Three of these patients recovered with chemotherapy alone, while two others received both serum and sulfadiazine. Two of their patients died.

Summary

The incidence of bacterial meningitis in the Henrietta Egleston Hospital for Children in Atlanta is reported.

The age incidence and mortality rates are discussed.

The mortality rates and frequency of complications as encountered before chemotherapy are compared with the deaths and complications after the introduction of the sulfonamides.

Case reports illustrating the treatment of meningococcic and influenzal meningitis as carried out since the advent of chemotherapy are presented.

Comment

The experience in this hospital and in other clinics indicates that chemotherapy is the treatment of choice in meningococcic meningitis. Favorable reports have been published concerning the use of sulfanilamide, sulfapyridine, sulfathiazole, and sulfadiazine.

A majority of the authors up to this time express the opinion that sulfapyridine is the ideal drug, although it seems quite possible that sulfadiazine may supercede it. Our own experience has been chiefly with sulfapyridine which has been administered in doses of 2 to 4 grains per pound body weight per day. Usually, it is given intravenously in the first two or three days in order to obtain high concentration rapidly. The dose is maintained for seven to ten days after the spinal fluid is normal, then gradually omitted. Recently our experience with sulfadiazine has been most encouraging. It has many obvious advantages over sulfapyridine. It is quite likely this derivative will prove the drug of choice.

The prognosis in influenzal meningitis has been tremendously improved by chemotherapy. Most observers agree that chemotherapy offers most in the treatment of this infection, although certain authorities still believe that anti-

serum should be employed in conjunction with chemotherapy.

Our experience with large doses of sulfapyridine and sulfadiazine in combination has been favorable. We feel that high concentrations of the drug quickly obtained are important in treating this infection. To accomplish this two to three grains of sulfapyridine, per pound body weight, each twenty-four hour period, is administered intravenously at eight to twelve hour intervals; at the same time, sulfadiazine is given in the same dose by mouth. Due to the tendency of this infection to relapse, it is wise to continue medication for ten days to two weeks after the spinal fluid is normal.

Our cases reported here indicate that high concentrations of the drug—40 mg.% and above, are tolerated by the host, and may be the important factor in sterilizing the spinal fluid.

The failure to sterilize the spinal fluid of an infant with influenzal meningitis, even though the concentration in blood and spinal fluid were 92 and 78 mg.% respectively, seems to indicate varying degrees of drug resistance on the part of the organism.

Due to variations in absorption and excretion of the drugs, it appears impossible to predict concentrations in the blood accurately. Further, we have observed that it is impossible to maintain a given concentration of the drug in the blood with a given dose. There is a tendency for the concentration to drop from day to day until dosage is increased.

Recent reports indicate that sulfadiazine alone may be the drug of choice in eradicating this infection. More investigation is necessary to establish this point.

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NEWS ITEMS

Dr. Joe Crosland of Greenville and Miss Mary Howard were married recently.

Dr. Jennings Cleckley of Bamberg, a lieutenant (S. G.) in the Navy, recently was ordered to duty at sea.

Dr. William S. Bethea, who formerly practiced in Latta, is now stationed at Morris Field, Charlotte, N. C.

Dr. Ralph E. Brown, who has practiced medicine in Barnwell for the past several years, has reported to Camp Rucker, La., to begin active duty in the medical corps.

Dr. Henry Herbert, formerly of Florence, is now a Lieutenant in the Medical Corps of the United States Army and is stationed at Bainbridge, Georgia.

Dr. James C. Brabham, formerly Union County Health Officer, has been commissioned and called for service in the Medical Corps of the United States Navy.

Dr. J. F. Hair, Aiken County Health Officer for several years, has been commissioned a captain in the army and assigned to duty at Camp Blanding, Fla.

Friends of Dr. James H. McIntosh of Columbia were delighted to see a picture of his portrait in the State of Monday, August 3rd. The portrait was presented by his patients and friends to the Columbia Hospital in special exercises on August 6th.

Dr. Robert P. Walton, who is now professor of pharmacology at the University of Mississippi Medical School, has accepted the position of professor of pharmacology at the Medical College of S. C.

The Human Pyramidal Tract

VI: An Evaluation of the Pyramidal Syndrome

ARTHUR M. LASSEK, PHD., M.D.
CHARLESTON, S. C.

The pyramidal tract, by definition consisting of all those fibers passing through the pyramids of the medulla, has long been regarded as pre-eminent in the central nervous system of man. Traditionally, it has been considered as synonymous with the "voluntary motor pathway" and lesions of it are supposed to produce a classical syndrome. The results obtained from recent experimental studies on the pyramidal system of primates ranking lower in the phylogenetic scale than man are in many respects not in harmony with those of clinical observations. These new findings are gradually being incorporated into the textbooks of clinical neurology. It is the purpose of the present article to compare the pyramidal syndrome, on the basis of fresh facts, in primates.

In evaluating the role of the pyramidal system in primates, one must necessarily take into consideration that differences exist between the members of this class. Man varies from other primates by having an erect position, by possessing a highly developed cerebral cortex and pyramidal tract and by being able to perform skilled movements. Another significant point is that man must be largely studied by the experiment of disease. The lesions which affect the central nervous system of man are not selective and they often develop slowly. In the history of human neurology, no injuries involving exactly the pyramidal tract or motor cortex are known. Therefore, other descending fibers may be affected in pathological conditions implicating the pyramidal tract of man. This is especially true of vascular accidents in the region of the internal capsule. Such destructions may mask the true role of the pyramidal system.

Before discussing the results obtained from animal experimentation, one should mention that phylogenetic studies on the pyramidal bundle have shown it to be one of the most enigmatical tracts in the central nervous system. It is found only in mammals. Manifold functions have been ascribed to it. It varies considerably from specie to specie in its size, in its position in the spinal cord and in its termination. In many of the lower mammals, it has a short course ending high up, either in the lower medulla or upper cervical region of the cord. When it descends into the spinal cord, it may occupy any funiculus. In sixteen representative mammals (marsupials, rodents, chiroptera, ungulates, carnivores and primates), varying in weight from a few ounces to about 1,600 pounds, the pyramidal tract of man was found to have the largest area and fibers of both the greatest number and biggest diameter. The pyramidal tract of the monkey is about one-fourth the size, has about half as many fibers and the largest are about one-half as large as those in man. Apparently, the most constant, anatomical characteristic of this fasciculus in mammals is that it occupies the pyramids on the anterior surface of the medulla. The lower primates do offer the advantage that more circumscribed lesions can be placed at will in the motor cortex or pyramids and their effects studied. The main disadvantage of this type of research from the clinical viewpoint is in trying to interpret the results in terms applicable to man.[1, 2, 3, 4]

Lesions involving the human pyramidal tract are conventionally thought to produce the following classical syndrome: spastic paralysis without atrophy of the muscles of the opposite side with the extremities and especially the digits affected the most, increase in the deep reflexes with clonus, loss of the superficial abdominal reflexes and the sign of Babinski. The number of pure motor cortical or pyramidal tract injuries in man are not abundant. Horsley,[5] who removed the arm area of the motor cortex in one human case, described a hypertonia which was most marked in the muscles of the fingers and which diminished as he moved to other parts of the limb. From his descriptions and photographs, the motor area was not normal and he un-

doubtedly removed tissue of the premotor cortex outside of the Betz cell area, so that his case may be inconclusive. Walshe[8] extirpated the leg area in one patient and subsequently found spasticity. He believes his experiment to be one in which the lesion is confined purely to the motor cortex or Betz cell area. Davison[7] presented two cases with blockage of the anterior spinal artery, both with destruction of the pyramidal tract and neighboring structures; one of these had a contralateral flaccid paralysis. The concept of spasticity has probably been formulated mainly on the basis of lesions in the internal capsule. Many fibers other than pyramidal may be affected in such expansive injuries and the additional loss of these may be responsible for the spasticity.

The results of animal experimentation on the primates immediately below man in the phylogenetic scale are in accord in some and not in harmany in other respects from the above mentioned views on the human pyamidal tract. The numerous research papers of Fulton, Kennard and their associates at Yale University Medical School[5, 9, 10] indicate that extirpations of the true motor cortex of such primates as chimpanzee, gibbon, baboon and monkey produce a motor deficit different than that described for man. In an imposing series, they have found that removal of this area results in flaccid paralysis. The higher the rank of the primate in their group the greater the loss of tone. In the chimpanzee, a positive Babinski reflex could be obtained following such lesions. They state that this reflex cannot be elicited below the chimpanzee in the phylogenetic scale.

Tower[11] studied the physiology of the pyramidal tract in the monkey by making unilateral and bilateral lesions in the pyramids. Bilateral injuries tell a more complete story because the pyramidal tract has a relatively well developed bilateral innervation. This investigation is important and represents one of the best on pyramidal function because of the location of the lesions and the thorough postoperative study. Tower found that the pyramidal tract exerted a powerful influence on the entire voluntary and vasomotor muscles. One of the characteristic symptoms produced was pronounced hypotonic paresis which affected all the voluntary muscles with the gravest deficit being in the digits. One animal with bilateral pyramidal section exhibited a marked loss of tone resulting in sagging of the head, abdomen and tail to the ground.

The results of experimentation on primates other than man in the last decade, therefore, suggest that circumscribed lesions of the motor cortex and pyramidal tract do not produce a spastic but a flaccid type of paralysis. Whether these observations can be applied to man is somewhat speculative. In this respect, Hausman[12] in 1939, at the 65th annual meeting of the American Neurological Association presented a case of pure flaccid hemiplegia uncomplicated by sensory defect in a 26 year old man. This individual exhibited flail-like extremities (loss of tone), increase of deep reflexes, loss of the superficial abdominal reflexes and the sign of Babinski. As the patient was still alive, no autopsy report was available but Hausman believed this might be an instance of a lesion involving the pyramidal tract and nothing more. This would be in harmony with the results of animal experimentation in other primates. Walshe[13] and Bergmark[14] state that there are some instances where cortical lesions cause a flaccid paralysis but the former remains a strong champion of the view that spasticity is the result of true motor cortical lesions in man. Tower[11] is convinced that when all facts are considered the only sure sign of pyramidal tract involvement in man is the loss of the minute control of the skeletal muscles and that when spasticity is present it is due to extra-pyramidal destruction.

In conclusion, it can be said that some of the results of recent experimentation on primates other than man indicate that pure lesions of the motor cortex (area 4) or of the pyramidal tract (pyramids) produce a type of paralysis which is hyptonic or flaccid rather than spastic in character. These investigators believe the same syndrome would occur in circumscribed lesions of the pyramidal system of man.

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The Effects of the War on the Medical Service in 12 South Carolina Counties with Limited Medical Personnel

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HOSPITAL SECTION
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The 12 counties listed on the attached tabulation had 87 active physicians in 1940 for a population of 216,225, or one active physician for every 2,485 persons. On July 1, 1942, there were 65 physicians in active practice in these counties, or one physician for every 3,121 persons.

In addition to the 65 physicians in active practice, 6 physicians from the 12 counties were in military service and 3 were awaiting call as of July 1, 1942, making a total of 74 active men who under normal conditions would be in practice in these communities. Of the 74 physicians available, 9, or 12.1 per cent, were in military service or awaiting call.

During the two-year period 1940-1942, the number of physicians in active practice in the 12 counties decreased from 87 to 65, a loss of 22 physicians, or 25.2 per cent. Of the 22 physicians lost, 9 went into military service and 13 were removed by death, retirement, or by moving to other locations.

Of the 65 physicians left in active practice, 29 or 45 per cent are 55 years of age and over. Of the 29 men over 55 years of age, 23 are between 55 and 65 and 6 seventy years of age and over.

The 65 men left in active practice in these counties will have an average of 405 more persons dependent upon them for medical care than would have been the case had no physicians been removed for military service—3,326 persons per physician as compared with 2,921.

To provide adequate medical care, the generally accepted minimum standard is one physician for every 1,500 persons. These 12 counties now average one physician for every 3,326 persons, or more than double the minimum number of persons per physician. There are 3 counties of the 12 where the average

number of persons per physician is 5,000 or more.

A further consideration is the fact that 9 of the 12 counties listed have no hospital facilities, which places a further limitation on the physicians in these communities in providing adequate medical service.

Another factor is the fact that the average income of physicians in rural areas is low. As a result, the compensation offered to medical officers by the Government has a tendency to draw men from these areas, especially the younger men, and no one will blame the young physician for leaving—he has an opportunity to serve his country in time of war, the compensation is better, and facilities for further training and experience are made available to him.

Counties	1940		1942						
					In Military Service		Age Groups of Active Physicians Left in Practice		
	*In Active Practice	Population Per Physician	*In Active Practice	Population Per Physician	Number	% of Active Men	55-65	66-69	70 & Over
TOTAL (12 counties)	87	2,485	65	3,326	9	12.1	23	0	6
Abbeville	10	2,293	8	2,866	2	20.0	6	0	0
Allendale	7	1,863	5	2,608	**1	16.7	1	0	2
Bamberg	10	1,864	8	2,330	**1	11.1	3	0	***1
Barnwell	10	2,014	9	2,237	1	10.0	2	0	0
Berkeley	8	3,391	6	4,521	1	14.3	2	0	0
Calhoun	8	2,029	4	4,057	0	0	2	0	1
Edgefield	5	3,579	5	3,579	0	0	3	0	0
Fairfield	9	2,687	6	4,031	1	14.3	0	0	0
Hampton	8	2,183	7	2,495	1	12.5	2	0	1
Jasper	4	2,753	2	5,505	**1	33.3	0	0	1
McCormick	3	3,456	2	5,183	0	0	0	0	0
Saluda	5	3,438	3	5,730	0	0	2	0	0

*Excluding physicians in Public Health Work.
**Awaiting call.
***Part time practice.

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SEPTEMBER, 1942

A PALTRY FEW

Several months ago the Procurement and Assignment Committee for South Carolina furnished the Office of the Surgeon General with a list of those physicians who were considered "available for military duty." These physicians received a letter from the representative of the Surgeon General asking for an interview. During this interview each physician, if his physical qualifications were acceptable, was offered a commission. Whether to accept or reject that commission then became a matter of decision for the individual physician.

Let it be said to the credit of South Carolina that her physicians believe in responding to the call of duty, and the records speak for themselves. The percentage of men who accepted these commissions and the percentage of physicians of this state who are now serving in uniform is second to none.

But there are a few—a paltry few—who have left a black mark upon an otherwise clean escutcheon. They are all under 37 years of age, they have been declared "available for military duty," they have been offered commissions in the army of their own country—and they have refused to do aught but continue their daily work. To the call of duty, patriotism, love of country they have turned a deaf ear—and they continue on their selfish paths.

They are fighting a battle which they will inevitably lose. Their first enemy is their own conscience which they are now trying to subdue. Their next enemy will be public opinion which will soon smite them with its wrath. And, finally, they will meet the power of the United States Government itself and this foe will be greater than their power to resist.

It is our fervent hope—and this is stated without any feeling of spite or rancor—that these men will be waited upon by Selective Service, that they will be lifted from civilian life and that they will be put in the ranks where they will be given a view of this country through the eyes of a marching private.

SCHOOL-DAYS

"School-days,
"School-days,
Dear old golden rule days.
Reading and writing and 'rithmetic
Taught to the tune of a hickory stick."

School-days are here again. Gone for another year are the freedoms of the summer months, the mornings spent in the old swimming hole, the afternoons of carefree play, the evenings of parties and picture shows. Boys and girls are now faced with the cold reality of books and classrooms and blackboards and homework.

School-days are here again and physicians will be studying this fall and winter as never before. Not in the little red-schoolhouse but in the world itself they will be learning their lessons.

They will study history as they read their

daily papers, they will receive their lessons in geography as they listen to the news, and they will brush up on their mathematics as they figure the taxes which lie ahead. But these are the minor courses. The major course will consist of those lessons which they will learn in their daily tasks.

A large number of physicians have left or will leave their accustomed paths of civilian medical practice to enter the armed forces of our nation. It is no easy task to step suddenly from the general run of a private practice or of a civilian hospital or a medical school into the routine of an army or navy hospital or into service in the field. These physicians must learn the ways of military life and of military medicine. They—who have been so independent in their own little spheres—must learn to become a cog in a great machine and to take orders from superior officers. They must learn to live without many physical comforts which have become, almost, a part of their beings. And—hardest of all—they must learn to live in a strange atmosphere among strange people without the comforting warmth and security of friends and home and family.

And those physicians who carry on their daily tasks in their own communities—they, too, must go to school. They must learn to make their hours count and their strength last for the work in the coming months will be plenteous and the laborers will be few. They must learn to deal with medical conditions beyond the confines of their immediate practice and to lend a helping hand to carry on the work of some physician who is now in service—for before this war is won the ophthalmologist may be treating the "flu" and the roentgenologist may be delivering babies. They must learn to fight, as never before, to maintain and uphold those fundamental principles of medical practice which have made American medicine what it is today. And above all, they must learn to be content with their lot, however hard the task may be, realizing full well that they can expect but little appreciation and acclaim from those they serve—for the public, being what it is, will bestow their cheers upon the men in uniform.

Yes, physicians are going to school again and the course of study which faces them is hard.

ERNEST W. CARPENTER, M. D.
1874-1942

To choose one's life work, to equip one's self well, then to be extremely busy and unusually successful—all adds up to a complete life.

Dr. Carpenter moved to Greenville in 1902. In 1905, he limited his practice to diseases of the eye, ear, nose and throat. Patients soon flocked to him from all parts of upper South Carolina. Not only his ability, but his personality, impressed itself on all those who came in contact with him. Probably no doctor in the Piedmont section of this state was better known. He enjoyed his work and was in his office or at the hospital from early morning until late at night. He seemed tireless and was just as happy when doing charity work as when attending the wealthy. For recreation, aside from golf, he enjoyed medical meetings most. He was a constant attendant at these and generally had something definite and worthwhile to say. Although, primarily interested in his specialty, he found time, through constant and extensive reading of medical journals and by mingling with doctors, to broaden and to keep up to date his knowledge of general medicine. Early in life he had done graduate work in New York, in Philadelphia, and abroad, at the clinics of London and Vienna. Perhaps because of this background, he was always on the lookout for new and better methods of diagnosis and treatment.

He enjoyed writing and contributed numerous original articles to various medical journals. He was a fellow of the American Academy of Otology and Laryngology, and of the American College of Surgeons, besides being a member of a number of other medical societies.

Some people believe that one's greatest happiness comes from family life. Dr. Carpenter and his beloved wife reared six children to whom they gave excellent educations; one of these becoming a doctor and another, a lawyer. He derived much happiness in his later years from his grandchildren.

Few men in this section have been as busy and have accumulated so large and varied a group of friends and patients. In addition to being a scientific doctor, he possessed the art of medicine. His words and manner were cheering and without professing to know psychology, he was a psychologist. His passing has left a void in the community, and in our medical society. We will greatly miss him and his contributions to our gatherings. As a man and as a doctor, he will long be remembered.

R. M. Pollitzer, M.D.

MEDICAL SUMMARIES

THE PREVALENCE OF SYPHILIS IN SOUTH CAROLINA

(A Statistical Study)

"How much syphilis is there in South Carolina?" That question was asked during one of the discussions at the recent meetting of the South Carolina Medical Association, and no one was able to given any adequate answer.

There has just appeared a volume which gives more information on this question than has been available hitherto. Prepared by the United States Public Health Service with the cooperation of national, state, and local boards of the Selective Service System, state and local medical societies, state and local Health Departments, and the Works Projects Administration, it presents a study of the results of serological blood tests for syphilis on selective service registrants. It embraces the first million reports received during the period Nov. 1, 1940 to April 15, 1942 for registrants examined.

The report is exhaustive and should be consulted by anyone who desires detailed information. In this abstract which we are presenting, figures will be presented for the United States as a whole, general figures will be presented for certain southern states, and a detailed study will be presented for South Carolina.

	Number examined	Percentage with syphilis
U. S.	1,084,826	4.54
Alabama	17,613	8.96
Florida	17,900	17.01
Georgia	18,704	13.29
Louisana	24,344	12.65
Mississippi	22,059	14.39
North Carolina	4,796	8.94
South Carolina	12,506	15.60
Tennessee	27,306	8.97
Texas	50,016	9.05
Virginia	22,082	8.79

TABLE 1

In Table 1 is presented the total number of men examined and the number infected with syphilis, for the United States as a whole and for the southern states.

To compare the national syphilis prevalence rate with that of any southern state without taking into consideration the large Negro population of the south is to get a distorted picture of conditions.

In Table 2 is given a detailed study of selectees and volunteers examined according to race and age groups for the U. S., for South Carolina, and for the neighboring states of North Carolina, Georgia, and Florida.

Group (Age)	U. S.	Ga.	Fla.	N. C.	S. C.
	(Percentage with syphilis)				
Urban White					
21-25	1.05	2.53	2.84	1.0	3.57
26-30	2.25	5.33	5.39	4.76	5.61
31-35	4.02	8.25	8.14	6.75	9.32
Urban Negro					
21-25	19.81	28.32	31.74	20.22	32.14
26-30	30.07	41.48	45.69	40.17	51.92
31-35	35.95	48.58	51.37	39.71	57.85
Rural White					
21-25	1.05	1.78	3.28	2.01	2.41
26-30	2.09	2.74	6.85	4.16	5.36
31-35	3.40	4.82	4.24	4.46	7.48
Rural Negro					
21-25	17.75	18.91	28.30	15.95	18.86
26-30	27.71	31.93	42.60	26.85	32.74
31-35	34.25	38.04	51.97	33.80	46.27

TABLE 2

From a study of Table 2 it can be seen that the syphilis incidence rate among the white selectees and volunteers in South Carolina and neighboring states is slightly higher than it is over the country generally but that in no

group does it rise over 9.4% incidence. Among the negroes, however, there is a great deal higher syphilis incidence in this state and in the neighboring states than there is in the country as a whole. In four of the age groups (two in Florida and two in South Carolina) over half of the negroes examined were found to have syphilis.

In what sections of South Carolina was syphilis found to be most prevalent among registrants examined?

Table 3 gives the syphilis incidence rate for registrants by counties.

County	No. men examined	Percentage with syphilis
Abbeville	177	16.38
Aiken	482	15.15
Allendale	64	10.94
Anderson	535	9.91
Bamberg	201	17.41
Barnwell	286	19.58
Beaufort	125	22.40
Berkeley	225	16.47
Calhoun	140	12.86
Charleston	1,233	21.33
Cherokee	105	4.76
Chester	161	17.39
Chesterfield	256	14.84
Clarendon	219	8.22
Colleton	75	14.67
Darlington	255	15.29
Dillon	85	15.29
Dorchester	184	9.24
Edgefield	163	11.04
Fairfield	212	9.43
Florence	727	19.39
Georgetown	84	17.86
Greenville	729	14.27
Greenwood	103	14.56
Hampton	99	18.18
Horry	363	14.88
Jasper	50	12.0
Kershaw	40	9.09
Lancaster	159	10.06
Laurens	240	14.58
Lee	268	18.28
Lexington	283	15.55
McCormick	136	13.97
Marion	260	20.77
Marlboro	222	14.86
Newberry	159	8.81
Oconee	211	6.16
Orangeburg	263	14.45
Pickens	151	6.62
Richland	859	19.90
Saluda	75	2.67
Spartanburg	647	12.36
Sumter	392	21.68
Union	79	8.86
Williamsburg	231	11.69
York	308	15.26
County Unknown	1,628	25.60
Total	12,505	15.60

TABLE 3

The incidence of syphilis in registrants ran higher in urban than in rural populations, and Table 4 gives the incidence in cities of 5,000 or more in South Carolina.

City	No. men examined	Percentage with syphilis
Charleston	900	23.11
Columbia	591	21.49
Greenville	341	19.35
Spartanburg	176	16.48
Anderson	152	8.55
Florence	282	25.53
Greenwood	11	----
Orangeburg	35	22.86
Rock Hill	153	16.34
Sumter	191	24.61
Aiken	103	18.45
Camden	12	----
Chester	72	19.44
Clinton	14	----
Conway	119	18.49
Darlington	57	17.54
Easley	55	10.91
Gaffney	71	5.63
Georgetown	57	19.30
Hartsville	110	18.18
Laurens	89	19.10
Marion	55	27.27
Newberry	68	10.29
Union	43	9.30

TABLE 4

Conclusions

The tables and figures which have been given are concerned with selectees and volunteers for military service. These men who are examined, however, present a relatively representative cross section of the people of South Carolina and the facts regarding syphilis in these men will probably be equally evident among all of the people of the state.

Certain broad conclusions can be drawn as a result of this study.

1. The southern states including South Carolina have a higher incidence of syphilis than have the other states in the Union.

2. While the incidence of syphilis is somewhat higher among the white men of the south than it is of white men throughout the sation, it is preponderantly higher among the southern colored population.

3. With few exceptions the incidence of syphilis is higher in urban communities in the southern states and in South Carolina than it is in rural communities.

4. Syphilis has been and still is one of the greatest health problems in South Carolina.

Bibliography

Results of Serological Blood Tests for Syphilis on Selective Service Registrants.

Based on the first million reports received during the period November 1, 1940 to April 15, 1941. For registrants examined in accordance with the provisions of the Selective Training and Service Act of 1940.

United States Public Health Service.

Dr. Paul K. Switzer, Jr., formerly of Union, is now stationed at Fort Benning, Ga.

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KENNETH M. LYNCH, M. D., PROFESSOR OF PATHOLOGY

CASE OF DR. ROBERT WILSON, JR. ABSTRACT NO. 462

Student K. H. Herbert (presenting):

Present Admission: 56 year old white woman admitted in January 1942, complaining of pain in right lower chest, nausea and vomiting. She was quite vague concerning her illness but apparently had felt well until the day prior to admission when she became nauseated and vomited several times. She complained of aching pain beneath the right breast where she had been injured five years ago. She developed a cough productive of brownish sputum and became dyspneic.

Previous Admissions: Was first admitted in 1932 complaining of burning on urination, frequency and palpitation. Physical examination revealed nothing unusual other than arteriosclerosis, B. P. 160/90. She returned in 1935 complaining of bilateral lumbar pain, intermittent fever and nausea. Physical examination revealed, temperature 100 degrees, tenderness over both kidney areas, dry scaly skin, thickened arteries and B. P. 138/88. There was albumin and pus in the routine urinalysis and in specimen obtained after cystoscopy. B. M. R.—11%. In 1940 she was admitted complaining of frequency, dysuria and lumbar pain. Her complaints began four days prior to admission with chill, intermittent fever and nausea. B. M. R.—17%, blood cholesterol 333 mgm., blood sugar 97 mgm. and urea n. 17 mgm. She was mentally confused but was getting along well until she began complaining of left thoracic pain and occasional nausea. She had no fever at this time but her B. P. dropped to 116/72. The thoracic pain gradually subsided. She was discharged after about three months in a greatly improved condition.

Past History: When very young she was hit on the head and for several years after that she was subject to fainting spells. Had several pelvic operations, none of any importance. Lately had noticed exertional dyspnea.

Physical Examination: Revealed a fairly well nourished and developed white woman, who appeared to be very lethargic, weak and acutely ill. T. 97.6 degrees. P. 70. R. 16. Head and neck: pupils were small and equal, reacted sluggishly. Retinal vessels were sclerotic. Ears and nose normal. No teeth. Tongue and throat dry and dirty. Thyroid not palpated. Skin: dry, cool and coarse. Glandular: no enlarged lymph nodes. Chest: normal. Respiration shallow. Lungs: slightly impaired resonance over right lower lobe. There were generalized showers of dry, sticky rales, inspiratory and expiratory. Fremitus not altered. Cardio-vascular: the heart enlarged to the left, the P. M. I. not located. Heart sounds distant. No murmurs or thrills. Rate regular. Peripheral arteries sclerosed. B. P. 115/75. Abdomen: generally tender to deep palpation but no spasm or rigidity. No masses or organs palpated. Pelvis: nothing remarkable. Non-pitting edema of extremities, face and trunk. Reflexes: normal.

Laboratory Examination:

Urinalyses showed 3 to 4 plus albumin and from 2-5 WBC/hpf.

Blood: RBC 3,970,000, WBC 9300, Hb. 11 gm., Polys 78, Lymph. 17, Monos. 5.

Sputum: negative for TB three times. Blood sugar 125 mgm. Wassermann negative. Urea N. 19 mgm.

Hospital Course: Slightly subnormal temperature throughout hospital course. Seemed agitated and restless the entire time, complaining of pain in her shoulders and appearing to be generally uncomfortable. She complained of nausea and coughed a good deal. At times respiration was of the Cheynes-Stokes type. On third hospital day she suddenly began gasping, became cyanotic, pulse became imperceptible and she died in a few minutes.

Dr. Wilson (conducting): Mr. Klauber, suppose you start the discussion.

Student Klauber: There are so many facts presented in this case that I think the best way to discuss it is to establish some sort of theory which is supported by these facts. I believe this patient had hypothyroidism. The dry scaly skin, albumin and pus in the urine, low metabolic rate and elevated blood cholesterol all support this diagnosis. She also apparently has generalized arteriosclerosis, a condition which accompanies hypothyroidism quite frequently.

Now I believe this generalized arteriosclerosis is the principle thing in this case because the coronary arteries were involved in the arteriosclerotic process. The myocardium is known to be weakened in myx-

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edema and the sclerosis of the coronary vessels further damaged the heart muscle which was not in good condition in the beginning.

There are two possibilities as to the cause of the cardiac failure. The most probable would be coronary occlusion on the basis of an atheromatous plaque. The progressive down-hill course, the sudden fall in blood pressure and the thoracic pain are all consistent with such a sequence of events. The other possibility is that the weakened myocardium may have suddenly caused acute cardiac dilatation due to extra strain thrown upon it.

I do not think the pain beneath the right breast is of any importance; it certainly does not fit into the pathological picture. The brownish sputum and dyspnea is in keeping with the cardiac failure.

Such clinical symptoms as nausea, vomiting, chills, fever and lumbar pain together with the finding of tenderness over the kidney area on physical examination cannot be explained except on the basis of a chronic or recurrent kidney infection.

Dr. Wilson: What is the difference between hypothyroidism and myxedema?

Student Klauber: I believe they are about the same.

Dr. Wilson: Do you think they are synonymous?

Student Klauber: Yes.

Dr. Wilson: You mentioned albumin and pus in the urine as being fitting to hypothyroidism. How do you explain that?

Student Klauber: I do not know the mechanism but it is supposed to occur. I still think there is difficulty in ruling out chronic pyelonephritis.

Dr. Wilson: In substance then you think this woman had hypothyroidism, which resulted in arterioscelosis and eventual myocardial weakness.

Student Klauber: Well, the two are commonly seen together, but that is still in the realm of the theoretical. In diseases of the thyroid there is some upset in cholesteral metabolism which results in the deposition of this material in the walls of the blood vessels, the arteriosclerosis being secondary to the myxedema.

Dr. Wilson: Your analyses then is arteriosclerosis due to the myxedema?

Student Klauber: Yes, sir.

Dr. Wilson: To what was the hypertension due?

Student Klauber: It was due to the arteriosclerosis.

Dr. Wilson: Mr. May, are hypothyroidism and myxedema synomymous?

Student May: No, sir.

Dr. Wilson: What does the word myxedema mean?

Student May: I do not know. I think she did have hypothyroidism, and possibly myxedema. The latter would certainly be suggested by the low B. M. R., dry scaly skin and non-pitting edema.

Dr. Wilson: Did the arteriosclerosis have anything to do with the myxedema or vice versa?

Student May: I think they were entirely independent.

Dr. Wilson: Mr. Edenfield, what does the word myxedema mean?

Student Edenfield: It means mucus swelling or edema.

Dr. Wilson: Do you agree with what has been said?

Student Edenfield: Yes, to a degree. We have enough evidence here to establish that the woman had hypothyroidism and at one time had pyelonephritis.

I think she very probably had coronary thrombosis and terminally she may have had infarction of the lung from a shower of emboli from the right side of the heart. It is unusual to have pain in the right side of the chest with coronary thrombosis and I suggest the pulmonary infarct as a means of explaining the pain.

Dr. Wilson: Mr. Edenfield, here are some electrocardiograms. Would you like to interpret these or would you like to have them interpreted for you?

Student Edenfield: I would rather have you read them, sir.

Dr. Wilson: Well these tracings show the changes characteristic of a coronary occlusion.

What do you think about myxedema causing albumin and pus in the urine?

Student Edenfield: Myxedema itself does not cause pus in the urine, but I think arteriolosclerosis could account for the albumin. The pus must have

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been caused by the pyelonephritis.

Dr. Wilson: When I saw this patient, I thought she presented the typical picture of myxedema, and that does not simply mean hypothyroidism. In addition she had definite arteriosclerosis and a known coronory occlusion which was suggested by the clinical story and corraborated by the electrocardiograms.

Dr. Kelley: I think the question arises here as to whether or not the renal lesions are in any way connected with the myxedema. I do not quite follow Mr. Edenfield when he explains the albumin on the basis of arteriolonephrosclerosis which in turn has been suggested as being due to the changes in cholesteral metabolism. Arteriolar sclerosis is a hyaline thickening of the arterioles which is distinct from atherosclerosis.

Dr. Wilson: Dr. Johnson, what about this question of kidney findings in myxedema?

Dr. Johnson: I do not know anything about it.

Dr. Lynch: (demonstrating heart and thyroid gland)— This case is rather complicated and it is difficult to unravel the cause and effect mechanisms involved. Atrophy of the gland and thyroiditis are associated with myxedema. Thyroid glands involved in either of these processes commonly show advanced degree of arteriosclerosis of their associated arteries. Whether vascular changes alone are capable of producing such a picture it is difficult to say. The arteries to this thyroid would have to have been traced and particular note made as to whether or not the arteries that supplied this gland were sufficiently closed to explain the extreme atrophy and dissolution of the thyroid tissue that has occurred here. These tiny nubbins of greyish tissue are all that are left of the thyroid gland. Microscopic examination shows a fibrous stroma through which are scattered lymphocytes and remnants of small atrophic thyroid acini, with some foreign body giant cell reaction about small globs of colloid. There certainly must have been very little secretion coming from this gland. The vessels show an advanced degree of arteriosclerosis.

The various forms of chronic thyroiditis are poorly understood conditions. Nobody knows what they are. The present condition of this gland may have been due to one of these conditions of thyroiditis or due to sclerotic closure of the arteries.

She had advanced atherosclerosis of the coronary vessels, both main arteries being practically completely closed. It is very remarkable that she lived as long as she did, as there is as much fibrous tissue in this heart as you are ever likely to see. There is also some more recent necrosis of muscle.

The kidneys show no evidence of arteriolonephrosclerosis and only the minor changes that we are accustomed to see with closure of the larger vessels of the kidneys. There is no relic of the pyelonephritis that she must have had on previous admissions.

She was also almost certainly mentally deranged as she advanced cerebral arteriosclerosis and multiple small foci of encephalomalacia scattered through the brain.

Dr. George R. Laub has opened an office in Camden, S. C. for the practice of eye, ear, nose, and throat. Dr. Laub was rejected from the military forces for physical reasons.

Friends of Dr. F. L. Carpenter of Latta, S. C., will be interested to learn that his son, F. L. Carpenter, Jr., is a captain in the Medical Corps and has sailed for foreign duty.

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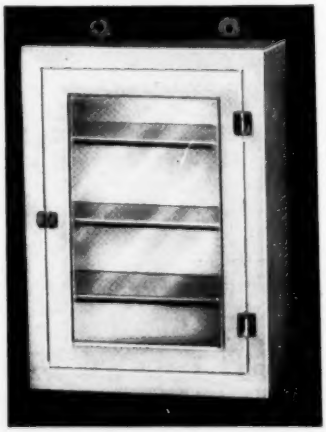

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BOOK REVIEWS

AMBASSADORS IN WHITE

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This is one of those rare books into which a physician can sink his teeth and thoroughly enjoy the process of mastication. It is the story of American Tropical Medicine, told by a reporter and writer who knows whereof he speaks and who bases his assertions on documented evidence.

A detailed account is given of the life and work of such men as Carlos Finlay of Cuba, Reed of Virginia, Gorgas of Alabama, Deeks of Canada, Noguchi of Japan. Shorter accounts are given of other men, men who are less known but who nevertheless played a great part in the fight against disease in South America.

But more than this, there are presentations of the various diseases which have scourged tropical mankind and the effect which they have had on the private lives of individuals and on the course of communities and nations. No one can read this volume without realizing that economic or social advancement in the tropics can only be made in common with advancement in the medical welfare of the people.

At this time when our eyes are looking beyond the borders of our own country as never before, this book has a special appeal and should enjoy a wide circulation among physicians.

ADVANCES IN INTERNAL MEDICINE VOL. 1

Editor—J. Murray Steele, New York

Associate Editors—William Dock, New York; Tinsley R. Harrison, Winston Salem; Chester S. Keefer, Boston; Robert F. Loeb, New York; Warfield T. Longcope, Baltimore; George R. Minot, Boston; I. Snapper, Peiping.

Interscience Publishers, Inc., New York. $4.50

The purpose of this book as expressed in the preface, is to put into concrete form "the notion that a distinct need exists in the broad field of internal medicine for an informal summary, from time to time, of progress in those fields in which progress has recently occurred."

The articles are written by men who have made contributions to the advances which are under discussion and in this volume the following subjects are presented: The Use of the Miller-Abott Tube in the Diagnosis and Treatment of Disorders of the Gastro-Intestinal Tract; The Use of Insulin and Protamine Insulin in the Treatment of Diabetes; Sympathetic Nervous Control of the Peripheral Vascular System; The Antibacterial Action of the Sulfonamide Drugs; The Choice of the Sulfonamides in the Treatment of Infection; Infections of the Urinary Tract; Present Trends in the Study of Epidemic Influenza; Hypertension—A Review of Humoral Pathogenesis and Clinical Treatment; Nephrosis; Riboflavin Deficiency.

The articles are readable, authoratative, and up-to-the-minute. Each is followed by a full bibliography. The only criticism which this reviewer has to make is that occasionally the writers become a little too technical and enter into too much detail—but this fault might be the redeeming feature for others who peruse the pages.

For the physician who is interested in what is new in internal medicine, this volume will bring him the answer in certain fields.

THE KENNY METHOD OF TREATMENT FOR INFANTILE PARALYSIS. 1942.

By Wallace P. Cole, Professor of Surgery; John F. Pohl, Clinical Instructor of Orthopedic Surgery, and Miland E. Knapp, Clinical Asst. Professor of Radiology. All from the University of Minnesota. New York City, National Foundation for Infantile Paralysis.

This is publication No. 40 of the National Foundation for Infantile Paralysis and simply describes Miss Kenny's technique of treatment in the acute stages of infantile paralysis. First developed in Australia, her methods have become outstandingly successful in America. Results have shown that her treatment has lessened the crippling deformities that so often follow this disease. No physician who treats infantile paralysis can afford to be without this knowledge and this small pamphlet (46 p.) is an excellent place to obtain it since it sums up the Kenny treatment clearly and succinctly.

Dr. Robert J. Black of Ruffin, S. C., has entered the service of the armed forces.

Dr. E. T. Kelley of Kingstree applied for a captain's commission in the U. S. Army but was given a major's commission instead. He will report for duty as soon as he is called.

DEATHS

Dr. Lee Jackson Wall, 84, died at his home in Easley on August 6. Dr. Wall, a graduate of Vanderbilt Medical School in 1891, practiced medicine for twenty-five years in Easley but was forced to retire from active practice five years ago. He was an Honorary Member of the South Carolina Medical Association. He is survived by his wife, one son and one daughter.

Dr. James Andrew Quinn, 25, died at his home in York on August 2nd. During his medical school career he developed the disease which led to his death but refused to give up and continued his studies. His final examinations were taken by him while in a hospital bed and only one month before his death he passed the State Board medical examination.

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